

REMARKS

Claims 1, 2, 4 and 6-17 are pending in this application. By this Amendment, claims 1, 2, 4, 6-9 and 13-17 are amended, and claims 3, 5 and 18 are canceled. Support for the amendments to claims 1, 4 and 8 regarding the term "utility" may be found in paragraph [0044] of the application publication (No. 2005/0138200), for example.¹ Support for the amendments regarding the term "ellipse" to the independent claims may be found in Fig. 3, and paragraphs [0058]-[0064], for example. No new matter is added. Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested.

The courtesies extended to Applicants' representative during the March 26, 2009 telephone interview are appreciated. The reasons presented during the telephone interview as warranting favorable action are incorporated into the remarks below, which constitute Applicants' written record of the interview.

The Office Action objects to claims 17 and 18. The amendments to claim 17, and the cancellation of claim 18, obviate the objections. Withdrawal of the objections to claims 17 and 18 is respectfully requested.

I. §112 Rejections

The Office Action rejects claims 1-9, 13, 14 and 16 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. The rejection is respectfully traversed.

Regarding the term "utility" and claims 1, 4 and 8, the claims are amended to obviate the rejection.

Regarding the term "leader node," the meaning of this term is well known in the art. For example, in a plurality of nodes in an ad hoc network, a node may be designated as a

¹ All citations to the application in the Remarks are citations to the application as published.

"leader node" for carrying out part of an algorithm and/or directing other nodes to carry out part of an algorithm. The leader node may also transfer leadership to another node. See also Figs. 4 and 5, and the discussion of those figures in paragraphs [0050]-[0054] and [0066]-[0069], for example. Because the term is well known in the art, the claims need not further define or limit the recited subject matter.

Regarding the term "selected path" and claims 2 and 4, the claims are amended to obviate the rejection.

Regarding the term "adding a very large positive value" and claims 3 and 5, these claims are canceled, obviating the objection.

Regarding the term "a current leader node" and claim 4, the term "leader node" is well understood by those of skill in the art. The term is also used throughout Applicants' specification. See, for example, the discussion of claim 1 above. A "current leader node" may be the node that is currently established or designated as the leader. For example, this application discloses that the querier node may be selected as the leader node, and that the next leader is selected as the first node along the selected path P, for example (Fig. 4; paragraphs [0051]-[0053]). Because one of ordinary skill in the art would have understood the metes and bounds of the term "current leader node," Applicants need not further define or limit the claimed subject matter.

Regarding the term "m-hop path" and claim 4, the claim is amended to obviate the rejection.

Regarding the term "the selection mechanism" in claim 5, the cancellation of claim 5 obviates the rejection.

Regarding the term "leadership" and claim 6, the meaning of the term "leadership" is well understood by those of skill in the art, as discussed above, regarding the terms "leader node" and "current leader node."

Regarding the term "leadership transfer mechanism" and claim 6, the Office Action asserts that "[a]bsent any functional description of this mechanism, or under what conditions leadership is transferred, the claim is indefinite." Claim 6 does recite functional description of the mechanism: it recites "a leadership transfer mechanism that changes leadership from one node to another" (emphasis added).

Regarding the term "costs associated with communication" and claims 7 and 9, one of ordinary skill in the art would have understood the meaning of this term. The costs may be the communication expense of going from node n to node $n+1$, and may be expressed in terms of communication energy or delay, for example (paragraph [0032]).

Regarding the term "information gain based on neighborhood sensor nodes" and claims 7 and 9, the Office Action asserts that "[n]either the specification nor the claims disclose what comprises" this term. The application does disclose, however, that information gain may be measured in accordance with a variety of explicitly named metrics (paragraphs [0033]-[0040]).

Regarding the term "establishing a neighborhood" and claim 7, the Office Action asserts that "[n]either the specification nor the claim itself discloses how a neighborhood is 'established'." One of ordinary skill in the art would have understood the metes and bounds of the claimed subject matter. For example, the application does disclose that a neighborhood may be established around a sensor node by defining the neighborhood as including all nodes within m -hops of the current leader (paragraph [0052]).

Regarding the term "RTA* type forward search," and claim 7, RTA* type searches are well known to those of skill in the art, and therefore need not be further limited or defined by the claim language.

Regarding the term "determining a source sensor node" and claim 9, the Office Action asserts that "[n]either the specification nor the claim itself defines on what basis a source

sensor node is determined." This is not a ground for rejection under 35 U.S.C. §112, second paragraph. The Office Action appears to regard the claim as being too broad, because the claim does not further limit the basis on which the determination is made. The second paragraph of §112 does not require, however, that claims be particularly narrow; the second paragraph only requires that the claims be definite. Claim 9 may be broadly worded, but one of ordinary skill in the art would have understood the metes and bounds of its scope.

Regarding the term "communication costs" and claim 9, the amendments to claim 9 obviate the rejection.

Regarding the term "belief state" and claim 9, the Office Action asserts that "[n]either the specification nor the claim itself defines what comprises a 'belief state'." The application discloses, however, that a belief state may be a state of belief about a target location, for example (paragraph [0083]). One of ordinary skill in the art would have understood the metes and bounds of the recited subject matter.

Regarding the term "relatively efficient" and claim 13, the amendments to claim 13 obviate the rejection.

Regarding the term "phenomenon of interest," the Office Action asserts that "[n]either the specification nor the claim itself provides the basis for determining what comprises the phenomenon of interest." The entire application, however, is directed to locating and/or tracking phenomena of interest using ad hoc sensor networks. See, for example, Figs. 8-18.

Regarding the term "destination node" in claim 14, the amendments to claim 14 obviate the rejection.

Regarding the term "estimating the information expected to be gained" and claim 14, the Office Action asserts that "[n]either the specification nor the claim itself provides the basis for performing this estimation." This is not a proper ground for rejection under the second paragraph of §112. The Office Action appears to regard the claim as being too broad,

because the claim does not further limit the basis for performing the estimation. The second paragraph of §112 does not require, however, that claims be particularly narrow; the second paragraph only requires that the claims be definite. See also the discussion of claim 9 above.

Regarding the term "target estimates" and claim 16, the Office Action asserts that there is insufficient antecedent basis for this term. In response, Applicants note that "target estimates" is plural, and is not preceded by the term "the" or "said." Thus, "target estimates" is used in an introductory sense in claim 16, and does not require antecedent basis.

Regarding the term "refin[ing] target estimates" and claim 16, the Office Action asserts that "[n]either the specification nor the claim itself provides the basis for determining what comprises this term." This is not a proper ground for rejection under the second paragraph of §112. The Office Action appears to regard the claim as being too broad, because the claim does not further limit the basis for refining the target estimates. The second paragraph of §112 does not require, however, that claims be particularly narrow; the second paragraph only requires that the claims be definite. See also the discussion of claims 9 and 14 above.

In view of the above, withdrawal of the §112, second paragraph, rejections are respectfully requested.

II. §103 Rejections

The Office Action rejects claims 1, 3, 13 and 14-16 under 35 U.S.C. §103(a) over U.S. Patent No. 6, 363,319 to Hsu in view of U.S. Patent No. 6,801,878 to Hintz; rejects claims 17 and 18 under §103(a) over Hsu in view of Hintz, and further in view of Stentz (Non-Patent Literature); rejects claims 2, 4-8 and 10 under §103(a) over Hsu in view of Hintz, and further in view of Edelkamp (Non-Patent Literature); rejects claim 9 under §103(a) over Hsu in view of Hintz, and further in view of Blei (Non-Patent Literature); and rejects

claims 11 and 12 under §103(a) over Hsu in view of Hintz, and further in view of Edelkamp and Gelvin (Non-Patent Literature). The rejections are respectfully traversed.

The Office Action concedes that Hsu does not disclose selecting a destination node by computing the utility of a plurality of network sensor nodes and selecting the node with the highest quality utility to be the destination node. The Office Action asserts that Hintz supplies the missing subject matter. However, Hsu and Hintz, individually or in combination, do not disclose, and would not have rendered obvious, that a locus of all possible paths from a current node to the destination node forms an ellipse with the destination node as one focus point and the current node as an other focus point, the ellipse is sampled with four candidate points, and a maximum utility among four paths corresponding to the four candidate points is used as an estimate of utility of the ellipse, as recited in claim 1, and similarly recited in the remaining independent claims.

Stentz, Edelkamp, Bleu and Gelvin do not supply the subject matter missing in Hsu and Hintz, and the Office Action relies on these references for other features.

The claimed subject matter results in greatly improving the estimation accuracy of a method for routing information queries in a network of sensor nodes. For example, the claimed subject matter may result in the mean-squared error decreasing by a factor of 5 to 7 (paragraph [0064]). Thus, the claimed subject matter provides an unpredictable solution to disadvantages of the prior art, which demonstrates non-obviousness (MPEP §2143.01 III and §2145 X.D.3.).

During the telephone interview, Applicants' representative presented arguments based on the above remarks and claim amendments. Examiner Shaw indicated that he had not reviewed the applied references in detail to determine whether they would have rendered obvious the subject matter disclosed in Fig. 3, on which the amendments to the independent claims are based. Accordingly, no agreement was reached. Examiner Shaw indicated that he

will review the applied references and claim amendments in detail upon receiving Applicants' written submission.

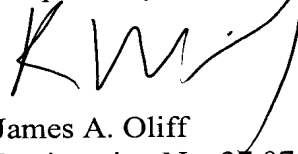
In view of the above, the combination of applied references would not have rendered obvious independent claims 1, 4, 7-9, 13 and 14. Thus, the combination of applied references would not have rendered obvious the dependent claims, for at least their respective dependence on allowable base claims, as well as for the separately patentable subject that these claims recite.

Accordingly, withdrawal of the §103 rejections is respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2, 4 and 6-17 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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